Module A

Review of Bond Yield

Overview

Introduction

In Phase I of this course, you learned how to compute the bond yield. Module A of Phase II provides a review of the concepts and techniques that you learned in Phase I.

Module B of Phase II discusses calculation of bond yield when adjustments must be made for various situations.

Objectives

At the end of this lesson the student will be able to:

- Explain why the bond yield is calculated.
- Calculate the yield on a fixed yield issue.
- Calculate the yield on a variable yield issue.
- Calculate the yield on an issue with fixed and variable rate bonds.

Why is Bond Yield Important?

The bond yield is used as follows:

- apply investment yield restrictions under IRC section 148(a),
- compute rebate liability under IRC section 148(f), and
- determine if the issue meets the private security or payment test under IRC section 141(b)(2).

Where is Bond Yield Found?

The bond yield must be entered on Forms 8038 and 8038-G. It is not required on Form 8038-GC.

It can also be found in the bond transcript, usually the Offering Statement.

If the bonds are advance refundings, the bond yield will be shown in a verification report, if one has been prepared. This report is prepared close to the date of issuance.

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Calculating the Yield on a Fixed Yield Issue

Definition of a Fixed Yield Issue

Treas. Reg. section 1.148-1(b) provides that a **fixed yield bond** is any bond whose yield is fixed and determinable on the date of issuance of the bond.

Treas. Reg. section 1.148-1(b) provides that a **fixed yield issue** is any issue if each bond that is part of the issue is a fixed yield bond.

Therefore, if the yield on any portion of the bond issue is not fixed on its issue date, then the entire issue is NOT a fixed yield issue.

Calculating the Yield on a Fixed Yield Issue

Yield on a bond issue is calculated in accordance with Treas. Reg. section 1.148-4. Treas. Reg. section 1.148-4(b)(1) generally provides:

Yield on a fixed yield issue is the discount rate that:

- *when used in computing the present value as of the issue date of all unconditionally payable payments of principal, interest and fees for qualified guarantee on the issue,*
- **produces an amount equal to the present value, using the same discount rate, of the aggregate issue price of the bonds as of the issue date.**

Example

On May 1, 1998 County S issues $15M of 5-year bonds at 6 percent. Interest is paid each May and November 1st. Principal is paid in full at maturity. The yield is equal to 6.00000%. See Figure A-1.

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Calculating the Yield on a Fixed Yield Issue, Continued

Figure A-1: Calculating the Yield on a Fixed Yield Issue

Issue Date: 5-1-1998 Compounding Intervals per Year: 2 30/360

Issue Price: $15,000,000. Yield: 6.00000 percent

DATE	ISSUE PAYMENTS	PRESENT VALUE *	DAYS BETWEEN DATES
11/1/1998	$450,000	$ 436,893.20	180
05/1/1999	450,000	424,168.16	360
11/1/1999	450,000	411,813.75	540
05/1/2000	450,000	399,819.17	720
11/1/2000	450,000	388,173.95	900
05/1/2001	450,000	376,867.92	1080
11/1/2001	450,000	365,891.18	1260
05/1/2002	450,000	355,234.16	1440
11/1/2002	450,000	344,887.53	1620
05/1/2003	15,450,000	11,496,250.98	1800
	$19,500,000	$15,000,000.33	

**** using a 6% discount rate***

Calculating the Yield on a Variable Yield Issue

Definition of a Variable Yield Issue

Treas. Reg. section 1.148-1(b) provides that a **variable yield issue** means any issue that is not a fixed yield issue. A **variable yield bond** means any bond that is not a fixed yield bond.

Introduction to Calculation of Yield

The yield on a fixed yield bond is calculated on the issue date unless the regulations require an adjustment because of certain provisions.

The yield on a variable rate issue cannot be calculated on the issue date, because the interest rates are unknown on the issue date. Therefore, the yield has to be calculated on a "looking backward" basis, because only the historical perspective can determine what the yield is. Treas. Reg. 1.148-4(c) provides that a yield on a variable yield issue is computed separately for each computation period.

Computation Date

Treas. Reg. section 1.148-3(e)(1) provides that the issuer may treat as the computation date:

- the last day of any bond year ending on or before the first required rebate payment date, AND
- thereafter, the end of each bond year or the end of each fifth bond year.

Once selected, the issuer may not change the computation dates after the first required rebate payment.

First Required Rebate Payment Date

According to Treas. Reg. section. 1.148-3(f)(1), the first required rebate payment date cannot be later than five years after the issue date.

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Calculating the Yield on a Variable Yield Issue, continued

Final Computation Date

Treas. Reg. section 1.148-3(e)(2) provides that the final computation date is the date that an issue is discharged.

If the issue is retired within three years of the issue date, the final computation date need not occur before the end of eight months after the issue date, or during the period in which the issuer reasonably expects that any of the spending exceptions under Treas. Reg. section 1.148-7 will apply to the issue.

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Calculating the Yield on a Variable Yield Issue, continued,
Continued

Example

On June 1, 1995, County M issues an issue of ten-year identical plain par bonds in an aggregate principal amount of $55,000,000. The bonds pay interest at a variable rate on each December 1 throughout the term of the issue. Also on December 1, principal payments in the amount of $5,500,000 are made. June 1, 2000 is selected as the first computation date. The following interest payments are made throughout the term of the bonds:

12/1/1995	$2.2M	12/1/2000	$4.9M
12/1/1996	2.4M	12/1/2001	3.8M
12/1/1997	2.7M	12/1/2002	3.6M
12/1/1998	2.9M	12/1/2003	2.5M
12/1/1999	1.9M	12/1/2004	2.1M

The yield on the bonds for the first computation period equals 6.96889 %, compounded semiannually. The yield on the bonds for the second computation period equals 19.91857 %. (**See Figure A-2.)**

Explanation:
The first computation date is June 1, 2000. All of the debt service payments made between June 1, 1995 and June 1, 2000 will be included in the first computation period. In this problem the debt service payments are made each December 1.

The bond is treated as if it matured on June 1, 2000. The value of the bond on this date is entered into the calculation. The value of the bond is calculated as follows:

Issue Price	$55,000,000
Principal Payments Made	<27,500,000>
Actual Interest Earned 12/1/1999-6/1/2000	2,450,000
Bond Value on 6/1/2000	$29,950,000

In order to determine the deemed issue price for the bonds outstanding at the beginning of the second period, the bond is treated as if it was reissued at the redemption value. The issue price of the reissued bond is the same as the redemption value used at the end of the first period.

All of the debt service payments made during the second period will be included. Since the bond matures at the end of the second period, the maturity value is included, and there are no more computation periods.

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Calculating the Yield on a Variable Yield Issue, continued,
Continued

Figure A-2: Calculating the Yield on a Variable Yield Issue

Computation Period 1:

Issue Date: 6-1-1995 Compounding Intervals per Year: 1 30/360

Issue Price: $55,000,000 Yield: 6.96889 percent

DATE	ISSUE PAYMENTS	PRESENT VALUE	DAYS BETWEEN DATES
12/1/1995	$ 7,700,000	$ 7,444,953.24	180
12/1/1996	7,900,000	7,140,700.85	540
12/1/1997	8,200,000	6,928,992.62	900
12/1/1998	8,400,000	6,635,566.89	1260
12/1/1999	7,400,000	5,464,783.53	1620
06/1/2000	29,950,000	21,385,003.21	1800
	$69,550,000	$55,000,000.33	

Computation Period 2:

Issue Date: 6-1-2000 Compounding Intervals per Year: 1 30/360

Issue Price: $29,950,000 Yield: 19.91857 percent

DATE	ISSUE PAYMENTS	PRESENT VALUE	DAYS BETWEEN DATES
12/1/2000	$10,400,000	$ 9,497,080.45	180
12/1/2001	9,300,000	7,081,956.93	540
12/1/2002	9,100,000	5,778,635.21	900
12/1/2003	8,000,000	4,236,307.04	1260
12/1/2004	7,600,000	3,356,020.38	1620
	$44,400,000	$29,950,000.00	

Calculating the Yield on an Issue with Fixed and Variable Rate Bonds

What is an Issue?

Treas. Reg. section 1.150-1(c)(1) provides that the term **issue** means two or more bonds that meet all of the following requirements:

- sold at substantially the same time,
- sold pursuant to the same plan of financing, and
- payable from the same source of funds.

This definition allows fixed yield and variable yield bonds to be in the same issue. Therefore, before the yield for an issue is calculated, the bonds which comprise the issue must be identified.

Example

Facts:

City Y sold two series of bonds on January 1, 1994. Series A is a fixed yield issue at 10 percent for $10M maturing in five years. Interest is paid each January and July 1st. All principal is paid at maturity. This series was used to make road improvements around a new courthouse complex.

Series B is a five-year variable rate issue sold for $10M. Interest is adjusted weekly and paid each January and July 1st. All principal is paid at maturity. The proceeds were used to build the courthouse.

Both series were general obligation (G.O.) bonds to be paid from general revenues.

These bonds meet all three of the requirements of Treas. Reg. section 1.150-1(c)(1) as follows:

- both bonds are sold less than fifteen days apart,
- both bonds are for the same project - the courthouse facility, AND
- both bonds will be paid from general revenues.

Since the bonds meet all of the requirements, they should be treated as one issue, and only one yield calculation should be performed. Further, because the yield on the issue is not fixed and determinable on the date of issue, this bond issue is a variable rate issue.

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Calculating the Yield on an Issue with Fixed and Variable Rate Bonds, Continued

Example, continued

Debt service for Series A consists of semiannual payments of $500,000 with a final payment of $10,000,000 plus interest.

Debt service for Series B is as follows:

7/1/1994 = $400,000	1/1/1997 = $ 420,000
1/1/1995 = 450,000	7/1/1997 = 480,000
7/1/1995 = 475,000	1/1/1998 = 460,000
1/1/1996 = 425,000	7/1/1998 = 450,000
7/1/1996 = 420,000	1/1/1999 = 10,420,000

The yield on the issue is equal to 9.393219. **(See Figure A-3.)**

Figure A-3: Calculating the Yield on an Issue with Fixed and Variable Bonds

Issue Date: 1-1-1994 Compounding Intervals per Year: 2 30/360

Issue Price: $20,000,000 Yield: 9.393219 percent

DATE	ISSUE PAYMENTS	PRESENT VALUE	DAYS BETWEEN DATES
7-1-1994	$900,000	$859,626.69	180
1-1-1995	950,000	866,679.19	360
7-1-1995	975,000	849,584.86	540
1-1-1996	925,000	769,859.13	720
7-1-1996	920,000	731,349.11	900
1-1-1997	920,000	698,541.35	1080
7-1-1997	980,000	710,718.72	1260
1-1-1998	960,000	664,982.62	1440
7-1-1998	950,000	628,535.84	1620
1-1-1999	20,920,000	13,220,123.23	1800
	$29,400,000	$20,000,000.73	

Summary

Review of Module A

Treas. Reg. section 1.148-1(b) provides that a fixed yield issue is any issue if each bond that is part of the issue is a fixed yield bond. Treas. Reg. section 1.148-4(b) describes the computation of yield on a fixed yield issue.

If any portion of a bond issue is NOT fixed on its issue date, then the entire issue is NOT a fixed yield issue. If the issue is not a fixed yield issue, then, according to Treas. Reg. section 1.148-1(b), it is a variable yield issue. The yield on a variable yield issue is calculated at the conclusion of each computation period.

Preview of Module B

Module B discusses the computation of bond yield when certain circumstances are present which affect the computation. The main topics discussed are:

- bonds subject to optional early redemption,
- bonds with qualified guarantees, and
- bonds with qualified hedges.